

# Lucas Busta

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## Highlights

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- Eight years research laboratory experience. Excellent skills in chemical analysis including data acquisition, processing, visualization, interpretation, and archival.
- Flexible and dedicated hard worker with exceptional organizational skills and attention to detail.
- Collaborates with domestic and international research groups and individuals with excellent communication and interpersonal skills to successfully accomplish project goals on time.
- Able to carry out multiple projects simultaneously, enabling concomitant pursuits of existing projects, collaborative undertakings, exploratory experiments, and written works.
- Five years hands-on experience maintaining, repairing, and documenting instrumentation and lab equipment: GC-FID, GC-MS, LC-ESI-MS, and gas delivery systems.

## Education

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2016 **Ph.D. Chemistry**, University of British Columbia

2011 **B.Sc. Chemistry, Biochemistry and Molecular Biology** (*dual major, honors*), University of Minnesota - Duluth

## Teaching

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### Training in Education

- 2016 **Instructional Skills Workshop**. Active and participatory learning and teaching techniques ..... 24 hrs.  
2016 **Writing Across the Curriculum Workshops**. Literature-based methods for teaching scientific writing . 7 hrs.  
2015 **Teaching Assistant Peer-Mentor Training**. Skills in facilitation, mentorship, and teaching ..... 6 hrs.  
2011 **Teaching Assistant Training**. Basic skills for teaching assistants in chemistry laboratories ..... 12 hrs.

### Teaching Experience

#### *Laboratory Mentor*

- 2011-16 Trained others in the use of chromatographic and mass spectrometric instrumentation, chemical separation, and basic chemical reactions: one visiting professor (YanJun Guo), two graduate students (Daniela Hegebarth, Yulin Sun), and one undergraduate student (Cassie McDonald). ..... 8 hrs. ea.

#### *Teaching Assistant Mentor*

- 2015 Coached teaching assistants new to advanced courses. 2 mentees. .... 1 semester

#### *Teaching Assistant*

- 2016 **Analytical Chemistry Lecture**: In-class tutorials, discussions, quizzes, office hours. 90 students. ... 1 semester  
2015 **Analytical Chemistry Lab**: Instrument design, operation. Analytical methods. 6–12 students. .... 1 semester  
2013/14 **Organic Chemistry Lab**: Basic chemical reactions and work-ups. 15 students. .... 2 semesters  
2012/13 **Analytical Chemistry Lab**: Instrument design, operation. Analytical methods. 6–12 students. .... 2 semesters  
2011/12 **First Year Resource Centre**: Tutored general chemistry students. 5–10 students. .... 2 semesters  
2009-11 **Analytical Chemistry Lab**: Quantitation, spectrochemistry, chromatography. 20 students. .... 4 semesters

## Technology

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R: Advanced user ..... *Statistical computing and graphics*  
LabVIEW: Advanced user ..... *Custom data acquisition and processing*  
L<sup>A</sup>T<sub>E</sub>X: Advanced user ..... *Professional typesetting and document generation*  
Mendeley: Advanced user ..... *Reference collection and management*  
D3 Javascript visualizations: Intermediate user ..... *Custom data visualization for complex datasets*  
Unix, Git(hub), HTML, CSS: Intermediate user ..... *Task automation, version control, website design*

## Research

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### Research Training

- 2016 **Bioinformatics for Evolutionary Biology** (UBC Biology 525D) ..... 20 hrs.  
2016 **R Carpentry Workshop** Basics of statistical computing in R ..... 12 hrs.  
2012 **Physical and Analytical Chemistry Seminar** (UBC Chemistry 540A) ..... 24 hrs.  
2012 **Principles of Chemical Separation** (UBC Chemistry 534) ..... 72 hrs.  
2011 **Bioanalytical Chemistry** (UBC Chemistry 533) ..... 72 hrs.  
2011 **Advanced Bioorganic Chemistry** (UBC Chemistry 569) ..... 72 hrs

### Research Experience

#### Graduate Research

- 2011-16 **Thesis title: “The Diversity and Biosynthesis of Plant Cuticular Waxes”**

*advisor: Dr. Reinhard Jetter, Department of Chemistry, University of British Columbia.*

- Detailed chemical analyses of hundreds of plant wax lipid extracts
- Chemical synthesis of authentic standards for structure elucidation and enzyme assay
- Extensive literature review and biosynthetic analysis of specialty plant surface lipids

#### Laboratory Experience

- Experience with GC-MS, GC-FID, LC-ESI-MS, ToF-SIMS, and NMR.
- Improved, implemented, and documented chromatography and MS equipment maintenance routines.
- Constructed and maintained literature and measurement databases for the research group.
- Developed custom data analysis software to increase throughput facilitating collaboration with domestic and foreign research groups.

#### Collaborations

- Asst. Prof. Jessica Budke, U. Tennessee-Knoxville. GC analysis of moss cuticular waxes. [1, 2] ... 2014-present
- Dr. Ulrike Bauer, U. of Bristol. GC and ToF-SIMS analyses of pitcher plant surfaces. [8] ..... 2015-present
- Dr. Olga Serra Figueras, U. de Girona. GC analysis of cork waxes. [7] ..... 2015-present
- Prof. Yuelin Zhang, UBC. GC analysis of amino acids. [3, 9] ..... 2015-2016

#### Undergraduate Research

- 2008-11 **Development of a time-domain reflectometry system for monitoring ice formation on bridge decks**

*advisor: Dr. John Evans, Department of Chemistry and Biochemistry, University of Minnesota - Duluth.*

- Developed LabVIEW data acquisition and processing software to process time-domain reflectometry signals.
- Drafted custom LabVIEW software for spectrophotometric data acquisition and processing.
- Documented the structure and functionality of developed software in written reports.

## Presentations

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### Conference Presentations

- 2016 **Lucas Busta**, Reinhard Jetter: “Structure and biosynthesis of branched cuticular wax compounds”, Poster, PHYTOCHEMICAL SOCIETY OF NORTH AMERICA, Davis, CA
- 2015 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: “Cuticular waxes from the leafy gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*”, Oral Presentation, BOTANICAL SOCIETY OF AMERICA, Edmonton, AB
- 2013 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: “Hydroxy esters from the gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*”, Oral Presentation, PHYTOCHEMICAL SOCIETY OF NORTH AMERICA, Corvallis, OR
- 2011 **Lucas Busta**, Evan Anderson, John F. Evans: “Development of a Time Domain Reflectometry System for the Determination of Ice Formation on Road and Bridge Surfaces”, Oral Presentation, SPRING UNDERGRADUATE RESEARCH SYMPOSIUM, University of Minnesota Duluth, Duluth, MN

### Invited Presentations

- 2016 **Lucas Busta** “The diversity and biosynthesis of cuticular waxes.” Special seminar, THE BOYCE THOMPSON INSTITUTE, Ithaca, NY.

- 2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, *THE CENTER FOR PLANT SCIENCE INNOVATION*, Lincoln, NE.
- 2016 **Lucas Busta** "Things I wish I'd known before starting graduate research". Special lecture, *UBC CHEMISTRY 319: Practical skills for chemical research*, Vancouver, BC

## Publications

- in review* [4] **Lucas Busta**<sup>†</sup>, Daniela Hegebarth<sup>†</sup>, Reinhard Jetter. "Changes in cuticular wax coverage and composition on developing *Arabidopsis* leaves are influenced by wax biosynthesis gene expression levels and trichome density." *PLANTA*
- 2016 [3] Pingtao Ding<sup>†</sup>, Dmitrij Rekhter<sup>†</sup>, Yuli Ding<sup>†</sup>, Kirstin Feussner, **Lucas Busta**, Sven Haroth, Shaohua Xu, Xin Li, Reinhard Jetter, Ivo Feussner, Yuelin Zhang. "Systemic Acquired Resistance Deficient 4 encodes a key enzyme for pipelicolic acid biosynthesis" *THE PLANT CELL*, *in press*
- 2016 [2] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter. "Cuticular wax coverage on *Funaria hygrometrica* is similar to vascular plants, but wax composition differs between surfaces of the leafy gametophyte, calyptra, and sporophyte capsule." *ANNALS OF BOTANY*, *in press*
- 2016 [1] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter. "Identification of  $\beta$ -hydroxy fatty acid esters and primary, secondary-alkanediol esters in cuticular waxes of the moss *Funaria hygrometrica*." *PHYTOCHEMISTRY*, Volume 121, Pages 38-49

## Manuscripts in preparation

- in prep* [5] **Lucas Busta** and Reinhard Jetter. "The structure and biosynthesis of branched wax compounds in *Arabidopsis thaliana*"
- in prep* [6] **Lucas Busta** and Reinhard Jetter. "The structural diversity and biosynthesis of specialty plant wax compounds"
- in prep* [7] Mercé Figueras, Marissa Molinas, **Lucas Busta**, Reinhard Jetter, Olga Serra Figueras. "Cuticular waxes and wax biosynthesis gene expression from *Quercus suber* and *Quercus ilex*"
- in prep* [8] **Lucas Busta**, Reinhard Jetter, and Ulrike Bauer. "Fine-tuning of epicuticular wax crystal slipperiness in a carnivorous pitcher plant"
- in prep* [9] Yanjun Guo, **Lucas Busta**, and Reinhard Jetter. "Composition of cuticular wax differs among organs of *Taraxacum officinale*"
- in prep* [10] Ok Tae Kim, Yurry Um, Mei Lan Jin, Young Chang Kim, Kyong Hwan Bang, Daniela Hegebarth, **Lucas Busta**, Radu Racovita, Reinhard Jetter. "Transcriptomic Analysis of Methyl Jasmonate-Elicited *Centella asiatica* Leaves and Characterization of Multifunctional C-23 and C-28 Oxidases Involved in Centelloside Biosynthesis"

## Awards

- 2016 **F. and M. Loewus Student Travel Award**: (\$200) ..... *Phytochemical Society of North America*
- 2015 **Graduate Student Travel Award**: (\$500) ..... *University of British Columbia*
- 2013 **Best Oral Presentation Award**: (\$250) ..... *Phytochemical Society of North America*
- 2011 **Casmir Ilenda Award for Outstanding Undergraduate Research** ..... *Univ. MN - Duluth*
- 2011 **F.B. Moore Academic and Leadership Award** ..... *Univ. MN - Duluth*
- 2010 **American Chemical Society Undergraduate Analytical Chemist of the Year** ..... *ACS*
- 2010 **Maguire Award for most promising chemistry student** ..... *Univ. MN - Duluth*
- 2009 **Maguire Award for most promising chemistry student** ..... *Univ. MN - Duluth*

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<sup>†</sup>co-first authors

## Service and Other Skills

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### Community Service

**Plants Are Chemists:** My blog with stories about phytochemistry in plants' and humans' daily lives. Written to fulfill the difficult but crucial task of communicating science to the public. [plantsarechemists.blogspot.com](http://plantsarechemists.blogspot.com)

- 2011 **Facing the Challenge: Climate change** With the honors program, helped organize a day-long series of panel sessions, debates, and presentations to stimulate discussion, awareness, education, and action on climate change.

### Societies

2013-... **PSNA** Phytochemical Society of North America

### Languages

**Spanish (Castellano)** Fluent in reading, writing, speaking

## References

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### Research

- Dr. Reinhard Jetter, Professor
  - Biological Sciences Building
  - 6270 University Boulevard
  - Vancouver, BC Canada V6T 1Z4
  - 604 822 2477
  - reinhard.jetter@botany.ubc.ca
- Dr. John F. Evans, Professor
  - UMD Chemistry
  - 227 Chemistry Building
  - 1039 University Dr
  - Duluth, MN 55812
  - 218 726 7232
  - jevans1@d.umn.edu
- Additional references available upon request

### Teaching

- Dr. Robin Stoodley, Senior Instructor
  - Department of Chemistry
  - 2036 Main Mall
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  - 604 827 5829
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- Dr. Dan Bizzotto, Professor
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